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ABSTRACT

This paper investigates determinants of transfer enrollment within four-year institutions. After outlining probable determinants (e.g., enrollment supply and demand and financial considerations), data from a national sample of institutions from 1984-1997 are used to examine whether these factors explain the composition of a school's enrollment. Next, the paper examines variation in enrollments across institutional types and finds three main differences: (1) the transfer enrollment rate, the percentage of an institution's incoming students who are transfers, is larger at public than private institutions; (2) the transfer enrollment rate falls for private institutions as they become more selective, but the relationship between selectivity and transfer enrollment share is more complex for public institutions; and (3) private liberal arts I colleges have lower transfer enrollment rates than other schools. Finally the paper investigates factors besides institutional type that determine the composition of a school's new student enrollment. For both public and private institutions, transfer enrollment rates are higher at institutions with more student attrition, less financial resources, less freshmen in campus housing, lower tuition and fees, and more students attending two-year institutions in the school's state. (Contains 17 references.) (SM)

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The Determinants of an Institution's Transfer Student Enrollment

by

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I. Introduction

Students transferring between institutions of higher learning are an important part of the higher education system. Recent work estimates, using a sample of students who began postsecondary education in the fall of 1989, that approximately one in three students transfer to another institution within 5 years (McCormick and Carroll, 1997).[1] Despite the importance of the transfer route in higher education, very little is known about why four-year institutions enroll transfer students and which institutional characteristics are associated with a large transfer student share.

This lack of knowledge is troubling for three reasons. First, this knowledge is required to predict transfer students' access to certain institutions, which in turn helps determine the potential benefit of the transfer route for a student. Second, a better understanding of the determinants of transfer enrollment provides insights into general differences in enrollment policies across institutions and over time. One would expect differences in enrollment management between public and private institutions, between research universities and liberal arts colleges, and between selective and non-selective institutions. In addition, one might expect overall enrollments as well as differences across institutional types to change over time as tuition levels and other factors vary.

The final reason why it is important to understand the determinants of an institution's transfer enrollment share is that such knowledge provides insights into the degree to which institutions of higher learning profit from the characteristics of transfers. As discussed in the next section of this paper, transfer students can potentially benefit

[1] More specifically, about one out of four students (28 percent) who begin at a four-year institution transfer while 43 percent of students entering two-year institutions transfer. In calculating these figures, McCormick and Carroll define a transfer as a student who moves from one institution to another without returning to the initial institution (McCormick and Carroll, 1997).

institutions in numerous ways such as reducing the inefficiencies created by high attrition rates or departmental enrollment imbalances. These productivity gains are important to both individual institutions and state systems of higher education with the latter entities especially able to realize these benefits because they can partially control the supply of transfer students.

Many state systems will find potential increases in efficiency especially appealing in the near future as the children of the "baby boom" reach the traditional college age.[2] Because it is unlikely these systems will be provided with a corresponding increase in resources to educate these additional students, they will need to find ways to make the same funds stretch further.[3] One possible response to this problem is to increase the number of students starting at two-year institutions which will result in more transfers within the system.[4] The state will enjoy cost savings from this policy to the extent that four-year institutions can realize the benefits of transfers and to the extent the state spends less on a student attending a community college than on a student attending a four-year institution.

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[2] Projections by the U.S. Department of Education predict that the number of high school graduates will increase from 2.820 million in 2000 to 3.153 million in 2008 and then will slowly decrease (The Chronicle of Higher Education Almanac Issue, p. 25). These changes, however, will not uniformly affect individual states; for example, thirteen states are projected to have a decrease in the number of high school graduates between 2000 and 2010. These states are primarily located in the northern central part of the country (such as North Dakota, Wyoming, and Iowa). On the other hand, some states in the southwestern (Arizona, Nevada, California) and southeastern (Florida, Georgia, North Carolina) parts of the country are expected to experience increases in the vicinity of twenty percent (The Chronicle of Higher Education Almanac Issue, p. 8). These latter states are the focus of the following discussion.

[3] See Hovey (1998, 1999) for a thorough discussion of why state appropriations to higher education are unlikely to increase.

[4] The University of California is an example of a state system increasing the number of transfer students in response to increases in enrollment. General campus enrollments are projected to grow to 210,000 full time equivalent students by 2010, which is a forty percent increase over 1998-99 enrollment levels (Hayward, 1999). Consequently, the system is planning to increase the number of community college transfers to 15,300 by the year 2005, an increase of 50 percent. This goal partially motivated the recent proposal to offer admission at a four-year institution to students who are in the top 12.5 percent of their high-school graduating class and who successfully complete two years at a California community college (Selingo, 2000).

This paper addresses this gap in the literature by investigating the determinants of an institution's transfer enrollment for four-year institutions. After outlining the probable determinants in Section II, I use data for a national sample of institutions from 1984 to 1997 to examine whether these factors do explain the composition of a school's enrollment. In section III, I examine the variation in enrollments across institutional type and find three big differences. The first difference is that the transfer enrollment rate, the percentage of an institution's incoming students who are transfers, is larger at publics than at privates. Second, the transfer enrollment rate falls for privates as institutions become more selective, but the relationship between selectivity and transfer enrollment share is more complex for public institutions. The final difference is that private liberal arts I colleges have lower transfer enrollment rates than other schools even when comparisons within the same selectivity group are made. Analysis of the rates over time finds that these three differences were exacerbated over the period.

In section IV, I investigate factors besides institutional type that determine the composition of a school's new student enrollment. The regression results indicate that for both public and privates institutions, transfer enrollment rates are higher at institutions with more student attrition, less financial resources, less freshmen in campus housing, lower tuition and fees, and more students attending two-year institutions in the school's state. In addition, some results are found to differ between publics and privates; for example, privates seem to increase their transfer student enrollment rate more than publics in response to situations where the additional enrollment of transfer students may reduce some inefficiencies. Also, selectivity continues to be an important determinant for private institutions and not for publics even when controls for additional determinants are

added. After discussing the regression results, the paper concludes in section V with a discussion of the implications of the paper's findings for policy and future research.

II. Possible Determinants of an Institution's Transfer Enrollment

An institution's transfer enrollment rate is determined by two factors: the institution's need for the characteristics of transfer students and direct attendees (enrollment supply), and the number of students of each type desiring enrollment (enrollment demand). The former influences recruitment efforts and the criteria by which applicants are accepted, while the latter determines the number of transfers and direct attendees produced by a particular enrollment policy. I discuss both factors in greater detail in this section, providing motivation for the subsequent empirical analysis.

Financial considerations are likely to be an important part of the institution's decision between transfers and freshman. Holding other differences constant, an institution will prefer students whose enrollment is most helpful to the net revenue of an institution. Specifically, an institution will be more likely to allocate an enrollment spot to a transfer over a direct attendee if:

$$MR_T - MC_T > MR_F - MC_F \qquad (1)$$

Here, MR_T (MR_F) represents the marginal revenue per year generated from enrolling a transfer student (direct attendee) and MC_T (MC_F) represents the marginal costs per year incurred from enrolling a transfer student (direct attendee). Equation (1) can also be rewritten as:

$$MR_T - MR_F > MC_T - MC_F \qquad (2)$$

Equation (2) indicates that institutions will increase their transfer enrollment share when the marginal revenue of transfer students increases relative to the marginal revenue of a direct attendee or when the marginal cost of transfer students decreases relative to the marginal cost of direct attendees.

Because direct attendees and transfers pay similar levels of tuition, the difference between the yearly marginal revenue generated from each type of student will depend on differences in the amount of aid provided by the institution. It is not obvious which type of student will need more institutional aid. On one hand, transfers may require less aid because they are likely to attend a less expensive institution for part of college which lowers their total educational costs. In this case, the institution might determine that the transfer requires less institutional aid than a direct attendee possessing similar financial resources. However, transfers may possess fewer financial resources because the lower potential cost of the transfer route could attract poorer students. Differences in financial aid need between transfers and direct attendees will likely differ across institutions and depend on whether the institution primarily draws transfers from community colleges or similar four-year institutions.

To understand how the marginal cost per year differs between transfers and direct attendees, it is vital to remember that transfers arrive on campus at a later stage of the educational process than direct attendees. Approximately two-thirds of transfers attend their first institution for at least 11 months while one-third are enrolled for a minimum of 21 months (McCormick and Carroll, 1997). Because approximately 90 percent of these students transfer credit between institutions, they often enter four-year institutions as sophomores or juniors. This characteristic causes transfers, relative to direct attendees, to

spend a larger percentage of their time on campus as upperclassmen. This finding is quite important to understanding differences in costs because the cost associated with educating upperclass students has been found to be higher than that of educating freshmen and sophomores (Brinkman, 1990).

Despite this finding, the marginal cost of transfers will be quite similar or lower than the marginal cost of freshman if much of the costs associated with transfers would be incurred whether or not the additional transfers are enrolled at the institution. For example, if large amounts of excess capacity exist in upperclass courses and programs, the enrollment of additional transfers students would not lead to higher costs because they would simply use resources that would go unused otherwise. Two types of institutions are likely to have this excess capacity: institutions with high attrition rates and institutions with numerous majors or departments.

Institutions with high attrition rates have more unused capacity in upperclass courses and programs because they have a smaller percentage of upperclassmen in their student body than an institution with a low attrition rates that enrolls the same share of transfers. Assuming that an institution does not commensurately restrict the breadth of their curriculum for upperclassmen, their upperclass courses will be relatively empty because of their lack of students who progress to junior and senior status.

Institutions that offer a wide variety of majors and upper-level courses have more excess capacity than other institutions because the expanded curriculum and the greater number of departments in these schools increases the possibility of departmental enrollment imbalances and unused upper-level class space. Transfers students will be attractive to these institutions for two reasons. First, as discussed above, they will spend

a greater percentage of their time on campus in upperclass courses which will reduce the amount of unused upper-level course space. Second, they can be easily assigned to departments that have enrollment shortages because their prior experience is likely to increase the probability they know their major upon application.

Financial considerations will not be the only factor affecting the institution's decision about which type of students to recruit and accept. When making enrollment decisions, an institution will also consider the effect on the external reputation of the institution. A recent change in the higher education landscape is the increasing role that institutional rankings by popular magazines play in determining an institution's reputation. These magazines, such as the *U.S. News & World Report*, rank institutions by a number of criteria believed to be correlated with institutional quality. Because freshmen test scores are included in the ranking methodology while transfer test scores are not, an institution wishing to improve their rankings can increase the percentage of new students who are transfers to create a more selective freshmen class with higher average test scores. The importance of these rankings to selective institutions and the extent to which these rankings have caused institutions to alter their behavior in other areas suggest that this response is not inconceivable.[5]

Finally, institutions may have particular "tastes" for transfer and direct attendee students. Some institutions will not enroll many transfer students for philosophical reasons even if they have financial incentives to do so. Institutions with more financial resources will be more likely do this, because resource depleted institutions often cannot

[5] Ehrenberg (2000) and Reisburg (2000) discuss instances in which these rankings have caused institutions to alter their behavior. Monks and Ehrenberg (1999) demonstrate the importance of these rankings. Using a sample of very selective private institutions, they find that a less favorable ranking in the *U.S. News &*

ignore financial concerns. An institution will have a preference for direct attendees if some faculty and administrators feel it is essential that a student complete all of his or her post-secondary education within the same program. These beliefs are likely to vary by institutional type and could lead some institutions to limit transfer enrollment through a variety of mechanisms such as acceptance criteria, recruiting and marketing efforts, and course requirements.

While the institution's desire for transfer students and direct attendees is an important determinant of the composition of its enrollment, the number of students from each group demanding enrollment could be even more crucial. For example, in a study of 16 liberal arts colleges in Ohio and Massachusetts, Duffy and Goldberg (1998) find that several institutions during the 1970s wished to increase their transfer student enrollment in order to replace students lost through attrition, but were unable to attract a sufficient number of qualified transfer applicants. Certainly, the range of enrollment levels available to other institutions is also constrained by the degree to which they possess characteristics that appeal to transfers and direct attendees.

Transfers are likely to differ from direct attendees in several attributes suggesting these two groups of students may be attracted to different institutional characteristics. To understand why they might differ, it is important to remember that transferring between schools can allow a student to lower their overall tuition costs, graduate from a more prestigious institution than allowed by their high school record, and resolve uncertainty about their ability to succeed in higher education at a relatively low cost.[6] Students

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World Report leads an institution to accept more of its applicants, to have less of its admitted applicants matriculate, to enroll a freshman class of lower quality, and to offer more generous financial aid packages.

[6] Hilmer (1997) finds that students who initially attend a community college and transfer to a four-year institution graduate from an institution of higher quality than those individuals who directly attend a four-

attracted to the lower costs of the transfer route may be more price sensitive than others suggesting that transfers may disproportionately seek four-year institutions that require fewer outlays for tuition, housing, or travel from home. Students who performed poorly in high school may be attracted to the other two potential benefits of the transfer route because their poor performance may have increased their uncertainty about future success in education and hindered their ability to obtain access to certain institutions. While these students may improve their credentials at their initial institution, their improvements may be unlikely to qualify them for admission to the more selective institutions.

The discussion in this section theorizes that the percentage of an institution's incoming class that is transfer students depends on the institution's selectivity level, Carnegie classification, type (public or private), attrition rate, number of majors, financial resources, tuition level, proximity to potential transfer students and direct attendees, and convenience for commuting students. The next sections will analyze institutional enrollment data to investigate whether these determinants do indeed influence an institution's transfer enrollment rate in the expected manner.

III. Enrollment Levels by Institutional Type

The discussion in the previous section suggests that the enrollment of transfer students might vary considerably between public and private institutions and between institutions of different selectivity levels or Carnegie classifications. Not only may many of the determinants outlined vary across type, but each type may have different "tastes"

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year institution. The largest quality increases are observed for students from poor families and for students who perform poorly in high school.

for transfer students. To analyze enrollment levels across these various groups, I use the College Board's *Annual Survey of Colleges* that contains data on the number of transfers and first-time freshmen at each school. From this data set, I drop all proprietary institutions, branch campuses, schools missing necessary data, and all institutions who report total undergraduate enrollment under 1,000 students for any year in the period. In addition, I only keep institutions meeting these restrictions that are labeled as Research, Doctoral, Comprehensive or Liberal Arts in the 1994 Carnegie classification scheme.[7] The data for these institutions span the years 1984 to 1997 which is a period of rapidly increasing tuition levels, increasing between-college variation in observable student quality, and varying levels of economic growth and governmental fiscal austerity.

Table 1 reports the average transfer enrollment rate for 1984-97 for all institution who report at least one year of enrollment data for that period. The transfer enrollment rate equals the percentage of an institution's incoming class that is transfers and is reported separately for private and public institutions. The results demonstrate that transfers are a smaller percentage of the student body at private institutions than at publics; on average, around 23% of a private institution's new student class consists of transfers while the corresponding figure for publics is 35%. The separation of institutions by their selectivity rankings from *Barron's Profiles of American Colleges* brings to light additional differences between publics and privates.[8] For private institutions, there is almost a monotonic relationship between selectivity and transfer enrollment with more selective institutions enrolling proportionately fewer transfer students. The relationship

[7] I use the Carnegie classifications reported in the CASPAR database. CASPAR uses the Carnegie Foundation's copyrighted, "A Classification of Institutions of Higher Education" to create this variable using the 1994 classifications.

differs at publics where moderately selective institutions enroll the highest proportion of transfer students. The dissimilarities between publics and privates could be due to several factors such as different "tastes" for transfer students, higher tuition levels at privates, or incentives created by many state higher education systems.

Table 1 also reports the average rates for different Carnegie classifications for both public and private institutions. The results are somewhat similar for publics and privates with liberal arts I colleges having the smallest transfer enrollment rates and research universities next in line. Where publics and privates differ is in the degree of difference between the average rates of different Carnegie classifications; privates show much more variation with the rates at liberal arts I colleges about one-third, and at research universities one-half, of the level found at private doctoral, comprehensive, and liberal arts II institutions. When comparisons are made of private institutions within the same Barron's selectivity categories, the much lower rates continue at liberal arts I colleges, but much of the difference is eliminated for research universities suggesting much of the differences in research universities may simply be due to the fact that they are more selective.

To examine changes in the transfer enrollment rate during 1984 and 1997, Figure 1 presents the average rate for each year in the period for both public and private institutions for all institutions who have all fourteen years of data when adjoining years are used to replace a missing year. The results indicate that both types of institutions experience some similar trends over the period; their rates mostly fell during the first five and last three years of the period and increased or stagnated during the time in-between.

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[8] The rankings are based on the average rankings from the 1983, 1991, and 1997 editions of *Barron's Profiles of American Colleges*.

These trends, however, differed slightly for publics and privates; the fall from 1984 to 1988 was more severe for private institutions and the rise after 1988 lasted until 1994 for publics, but only until 1990 for privates. These differences caused the transfer enrollment rate to be 14.5 percent lower for privates in 1997 than in 1984, but 3 percent higher for public institutions. Within both the public and private groups, the rates for the more selective institutions fell relative to their less selective counterparts. Moving from the less to more selective categories in Table 1, the changes between 1984 and 1997 are –10, -9, -24, and –37 for the privates and +14, 0, -7, and –10 for the publics.

This shift towards lower transfer student shares at privates relative to publics and at more selective relative to less selective institutions could be due to several changes taking place during 1984 and 1997. The rise in tuition prices over the period is one candidate because it may have put selective and private institutions, which have higher tuitions, out of the price range of transfer students who are likely to be more price sensitive.[9] The continuing increase in between-college variation in observable student quality may have also contributed to the changes because some transfers may not have the academic credentials necessary to meet the resulting toughened criteria at more selective institutions.[10] On the other hand, the increasing importance of the *U.S. News & World Report* rankings would not have contributed to the enrollment changes because

[9] In 2000 dollars, the average tuition at private institutions rose from $8,186 in the fall of 1984 to $14,581 in the fall of 1997; meanwhile, the average tuition at public institutions rose from $1,838 in 1984 to $3,320 in 1997 (College Board, 2000)

[10] Hoxby (1997) finds that the difference between the institution at the 90th percentile of average combined SAT score and the institution at the 10th percentile rose from 334 to 370 for private institutions and rose from 252 to 276 for public institutions between 1981 and 1991.

these rankings provide the strongest incentive to increase transfer enrollment to higher ranked and more selective institutions.[11]

One factor that appears to be closely related to the transfer enrollment rate is the number of high school graduates in that year. Changes in the size of the high school graduating class and the average transfer enrollment rate appear to move in opposite directions. The high school graduating class peaks during the period in 1988 when it reached 2,500,191, but then falls for the next six years reaching a low of 2,220,849 in 1994 before growing for the rest of the period (NCES, 1998). These trends match up closely with the transfer enrollment rate which hit a temporary low in 1988, mostly rose for the next six years, before falling at the end of the period. This relationship is not surprising because the number of students in the direct attendee pool are primarily drawn from students graduating high school in that year while the transfer student pool is drawn from earlier high school classes.

The close relationship between the transfer enrollment rate and the number of high school graduates suggests that changes in the rate may be primarily driven by changes in the number of applicants. Figures 2 and 3 provide evidence that allows one to examine whether the increasing disparity in the transfer enrollment rate between publics and privates is simply due to changes in the application behavior of transfers and direct attendees during the period. For the years 1987-97, these figures graph, for institutions who have all ten years of data when adjoining years are used to replace a missing year, the transfer enrollment rate, weighted transfer application rate, and the acceptance rate

[11] Top ranked institutions are given a numerical ranking in the *U.S. News & World Report* while other schools are simply put into a group with institutions of similar quality. Therefore, slight changes in an institution's performance as measured by the ranking criteria are more transparent to potential students for the top ranked institutions than other schools.

ratio. The weighted transfer application rate is simply the number of weighted transfer applicants divided by the number of weighted total applicants; the term weighted applicants refers to the number of applicants multiplied by the percentage of accepted applicants who eventually enroll. The other figure, the acceptance rate ratio, equals the average institutional transfer acceptance rate divided by the average institutional freshman acceptance rate. All three of these figures are normed to 1 in 1987, so that changes can be more easily observed.

In both figures, the transfer enrollment rate is most closely associated with the weighted transfer applicant rate providing additional evidence that the trends were primarily driven by changes in the number of students desiring enrollment in each group. The transfer enrollment rate and the weighted transfer applicant rate rose by similar amounts during the period for public institutions, while for privates both figures dropped in similar fashions. While the acceptance rate ratio did not vary as much as the application figure, it did explain some of the changes over the period. The public acceptance rate ratio remained mostly constant over the period while the ratio fell for privates which caused the gap between the private and public transfer enrollment rates to separate further.[12]

IV. Multivariate Analysis

Section II outlined numerous determinants beyond institutional type, and this section investigates the effect of these determinants on an institution's transfer enrollment

[12] The results discussed in Figures 2and 3 differed slightly across selectivity levels. For privates, the weighed applicant rate fell for the more selective institutions while the acceptance rate ratio fell more for less and moderately selective institutions. For publics, the application figures did not vary by selectivity,

rate. For these analyses, I use additional data from the College Board's *Annual Survey of Colleges* as well as data from CASPAR, which contains information gathered by the U.S. Department of Education in its Higher Education General Information System (HEGIS) and Integrated Postsecondary Education Data System (IPEDS) surveys.

The combined data set contains a number of variables that are good proxies for the concepts discussed in section II. The percentage of freshmen that do not return for their sophomore year is included to represent total student attrition because other data on attrition levels are not available and most students who leave an institution do so after their first year. To measure the financial resources of an institution, I use the level of non-tuition current fund revenue, and to gauge the number of majors, I use the average (for 1989-94) number of four-digit Classification of Instruction Programs (CIP) with at least five graduates. I also include a variable measuring the average undergraduate enrollment of the school for 1984-97 to control for institutional size.

To examine whether differences in selectivity and institutional type persist when controls for additional determinants are included, the data set contains dummy variables for different rankings from the *Barron's Profiles of American Colleges* and for different Carnegie classifications. The percentage of an institution's total applicants who are accepted is also included to measure selectivity.

Finally, the data set contains information representing the attractiveness of the institution to transfer students and direct attendees. The tuition level of an institution is added because transfers may be more price sensitive than direct attendees. A rural dummy variable and the percentage of freshmen who live on campus are included to

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but the acceptance rate ratio fell for the more selective institutions and rose for the less selective institutions.

capture the possibility that transfer students prefer conveniently located institutions to which they can easily commute to reduce costs. Finally, the ratio of students attending two-year institutions to students attending four-year institutions in the school's state during the previous year is included to capture the size of the pool of transfers and direct attendees in that institution's area.

Table 2 contains summary statistics for 1984 to 1997 by selectivity groups for all the variables in the subsequent analyses. The results demonstrate that private institutions have lower attrition rates, lower number of majors, less non-tuition current fund revenue, smaller enrollments, more freshman living on campus, high tuition and fees, and a lower probability of being located in a rural area. In addition, selective institutions are shown to have lower attrition rates, more majors, more non-tuition revenue, higher tuition and fees, more freshmen in campus housing, and a lower acceptance rate.

To investigate the effect of these variables on the transfer enrollment rate, I first examine differences across institutions at a point in time. Because the transfer rate is an aggregate measure that takes values only between 0 and 1, I estimate regression models specified as:

$$\ln\left[\frac{p_i}{1-p_i}\right] = \alpha + \beta X_i + \varepsilon_i \qquad (3)$$

where p_i is the percentage of new students who are transfers for institution i, X_i is a vector of the explanatory variables, and ε_i is the error term.

Table 3 reports results separately for public and private institutions for equation (3) using a pooled sample of all years from 1984 to 1997.[13] In addition to the coefficient

[13] A pooled sample is used to provide an overview of the effect of each variable for the entire period. Using the pooled sample raises a concern, however, because the error terms of observations of the same

and standard error for each explanatory variable, Table 3 includes the marginal effect of each variable for an institution with the average transfer enrollment rate for the group being studied.[14]

Turning first to those variables representing the attractiveness of an institution to transfer students, almost all have the anticipated sign for both public and private institutions. Specifically, the results suggest that for both publics and privates, transfer enrollment rates are higher at institutions with less freshmen living on campus, lower tuition and fees, and more community college students in their state. While the findings also indicate that private institutions in rural settings have lower rates than other privates, a rural location does not affect the transfer student share of public institutions.

The results for the dummy variables representing selectivity levels and Carnegie classifications show that the differences across groups found in Tables 1 and 2 change when controls for additional determinants are added. For both public and private institutions, the results indicate that the gap between research and doctoral universities and liberal arts colleges grew when controls for additional determinants are added; in addition, research and doctoral universities are now shown to have a higher transfer enrollment rates than comprehensive universities.

The much lower rates at the most selective private institutions relative to other privates are mostly eliminated when controls for other determinants are added.[15] In

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institution over multiple years will be correlated. To adjust for this, robust standard errors with clustering are used. All observations are reported in which no data are missing. Regressions are weighted by the total number of possible years divided by the number of years that the institution is not missing any data.

contrast to the results for the variables representing Barron's rankings, the findings for the percentage of applicants who are accepted, another measure of selectivity, are very similar to those found in Table 1; lower acceptance rates are associated with lower transfer enrollment rates for private institutions but not for publics.

Turning to other institutional characteristics, it does appear that institutions with higher attrition rates enroll proportionately more transfer students. This result is stronger for privates than publics. If you transform the coefficients into marginal effects, one finds that for an institution with the average transfer enrollment rate for each group, a ten percentage point (approximately one standard deviation in the attrition rate for the entire sample) increase in the number of freshmen not returning for their sophomore year is associated with a 2.9 point increase in the percentage of new students that are transfers for privates and a 1.9 point increase for publics.

The number of majors does not appear to be as strong a determinant of an institution's transfer enrollment rate as the attrition rate is. The coefficient for public institutions is very close to zero and possesses the opposite sign as that predicted earlier in the paper. On the other hand, the result for private institutions is consistent with the earlier discussion as an increase in 17 majors with at least five graduates (approximately one standard deviation for the entire sample) is associated with a 2.0 point increase in the percentage of new students that are transfers. This result, however, is not statistically

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[14] Following Ramanathon (1995), to understand how the marginal effect is obtained, note that if you solve equation (3) for P you get: $P = \frac{1}{1 + e^{-(\alpha + \beta X + \varepsilon)}}$. To derive the marginal effect of X on P, one must calculate the partial derivative of P with respect to X: $\frac{\partial \hat{P}}{\partial X} = \frac{\hat{\beta} e^{-(\hat{\alpha} + \hat{\beta} X)}}{[1 + e^{-(\hat{\alpha} + \hat{\beta} X)}]^2} = \hat{\beta}\hat{P}(1 - \hat{P})$.

significant at conventional levels. Stronger results were obtained for the level of current fund revenue per student at a school; both public and private institutions enroll proportionately more transfer students when they have less financial resources.

Tables 4 and 5 presents results for regressions that were run separately for different Barron's selectivity groups. Because more selective institutions have a queue of students from which to choose, they can adjust their transfer enrollment rate through changes to the acceptance rate or through increased recruitment of direct attendees or transfers while less selective institutions can only use the latter route to adjust their enrollment. Therefore, we would expect more selective institutions to be more responsive to determinants such as their attrition rate or their number of majors.

The results for the attrition rate do show such a relationship. For both public and private institutions, an increase in the attrition rate is usually associated with a larger increase in the transfer enrollment rate as the institution becomes more selective. These same findings do not exist for an institution's number of majors. The positive result found in Table 3 for private institutions grows smaller as we move from less to more selective institutions. Another interesting result is that the level of an institution's non-tuition revenue has a larger effect on the transfer enrollment share for non selective institutions.

To better utilize the longitudinal nature of the data set, I now turn to an analysis of changes over time at each institution as opposed to the above cross-sectional approach examining differences across institutions at a point in time. Specifically, I use fixed effects models to examine those variables used in Tables 3 that vary over time. While

[15] To check that these different results for selectivity groups are not due to the inclusion of the acceptance rate which also measures selectivity, the same specifications were run without the acceptance rate. Results

this model improves upon the previous analysis by controlling for all unobserved institutional characteristics that are constant over time, it is more likely to be hindered by measurement error bias. Because there is less variation across time than across institutions, measurement error will compose a larger share of the total variation, and coefficients will be more heavily biased towards zero if the measurement error is random. This concern may be important for this study, because some variables such as the attrition rate do not appear to be updated yearly and contain more measurement error as a result.[16]

Using data for 1984 to 1997, the following fixed effects model is estimated:

$$\ln\left[\frac{p_{it}}{1-p_{it}}\right] = \alpha + \beta X_{it} + \gamma D_i + \delta Y_t + \varepsilon_{it} \qquad (4)$$

where p_{it} is the percentage of new students who are transfers for institution *i* in year *t*, X_{it} is a vector of the explanatory variables, D_i is a vector of institutional dummy variables, Y_t represents a vector of year dummy variables, and ε_{it} is the error term.

The results for this model for both private and public institutions are presented in Table 6 and contain many similarities to the cross-section results. The transfer enrollment rate continues to have a negative association with the level of non-tuition current fund revenue, percentage of freshman living on campus, and tuition and fees for both public and private institutions. In addition, the effect of the attrition rate and the percentage of accepted applicants on the transfer enrollment rate continues to have a stronger effect on private institutions than publics. The coefficient on the former determinant is positive for both publics and privates, but is larger and statistically significant for privates. The coefficient on the latter is only positive for privates;

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were surprisingly similar for all selectivity dummies in this alternative specification.

however, it is not statistically significant at conventional levels. These results are consistent with two findings from earlier in the paper. First, private institutions continue to reduce their transfer enrollment share when they become more selective while public institutions do not. Second, private institutions appear to adjust their enrollment more than publics to take advantage of potential improvements in efficiency generated through the enrollment of transfers. Table 7 presents fixed effects regressions run separately for each selectivity level. The results are surprising because the attrition rate has a larger effect on the transfer enrollment rate for less selective institutions than for moderately and more selective schools.

VI. Conclusion

By analyzing the enrollment data for a national sample of four-year institutions, this paper provides evidence on the primary determinants of an institution's transfer enrollment share. As discussed in the introduction, this improved understanding of enrollment levels is important for several reasons. First, to the extent that such determinants change in the future, subsequent changes in enrollments can be inferred. For example, the evidence in this paper suggests that private institutions respond to an increased number of applicants (i.e. increased selectivity) by decreasing the share of transfers in their incoming student class while publics do not exhibit similar behavior. Therefore, a surge in the population of students and the subsequent increase in applicants may lead to larger reductions in the transfer enrollment rates for privates than for publics.

[16] The attrition rate at fifty-seven percent of the institutions does not change from year to year suggesting that many institutions do not always report updated data.

The analysis in this paper is also important because it provides insights into differences in enrollment policies across institutional types as well as insights into the degree to which institutions of higher education are reaping the benefits of enrolling transfer students. For example, the results indicate that the relationship between a school's transfer student share and both the attrition rate and the number of majors is stronger for private institutions than for publics. This result might be expected if mandates from the state government restrict the ability of public institutions to be strategic in their enrollment. On the other hand, these findings could be considered surprising if one believes that state coordination between four-year institutions and community colleges allows publics to be more strategic in their enrollment decisions. This discussion suggests the possibility of efficiency gains within state systems through improved planning.

Adjustments to the flow of transfer students between public institutions must be done cautiously because the weaker results for publics may simply reflect that access for transfer students is a high priority for many top public institutions. The ability of transfers, many of who originally start at community colleges, to move far up the selectivity hierarchy may be a more important goal than potential efficiency gains. Any changes to the current system must be carefully undertaken to limit any negative effects on transfer student's access to the best public institutions.

A better understanding of these issues can only be developed with more research. For example, in-depth examination of individual institutions or state systems would provide detailed information that statistical analysis of national samples cannot bring to light. In addition, investigation along the lines undertaken in this paper can be extended

to better understand the factors driving the relationship between the variables considered here. Future work will use measurements of state strength in articulation agreements as calculated by Ignash and Townsend (2001) to investigate whether institutions in states with strong articulation agreements differ from those with weaker agreements.

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Table 1: Average Transfer Enrollment Rates for 1984-97 by Selectivity Level and Carnegie Classification

A. By Barron's Selectivity Ranking

	Private Institutions			Public Institutions		
	n	Mean	Std Dev	n	Mean	Std Dev
Non & Less Competitive	64	0.295	0.162	173	0.321	0.113
Competitive	187	0.299	0.150	193	0.380	0.138
Very Competitive	100	0.180	0.120	59	0.364	0.163
Highly & Most Competitive	82	0.082	0.063	14	0.205	0.076

B. By Carnegie Classification

	Private Institutions			Public Institutions		
	n	Mean	Std Dev	n	Mean	Std Dev
Research Universities	38	0.134	0.103	82	0.323	0.113
Doctoral Universities	38	0.258	0.121	60	0.400	0.172
Compehensive Universities	162	0.315	0.163	244	0.350	0.130
Liberal Arts I Colleges	98	0.096	0.065	6	0.266	0.147
Liberal Arts II Colleges	97	0.248	0.137	47	0.334	0.137

Table 2: Summary Statistics, Pooled 1984-1997

Private Institutions	All		Non/Less		Competitive		Very/Highly/More	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Transfer Enrollment Rate	0.224	0.166	0.277	0.172	0.297	0.167	0.135	0.111
Attrition Rate	0.181	0.098	0.282	0.084	0.217	0.084	0.115	0.065
# of Majors	31.683	10.772	24.738	9.248	30.414	8.984	35.000	11.580
Log (Non-Tuition Current Fund Rev. per student)	9.912	1.210	9.149	0.671	9.483	0.791	10.569	1.349
Log (Average Undergraduate Enrollment)	7.790	0.578	7.566	0.481	7.763	0.476	7.884	0.671
State 2-yr. Student/ 4-yr. Student Ratio	0.719	0.485	0.675	0.328	0.765	0.527	0.685	0.474
% Freshman Living on Campus	0.783	0.252	0.682	0.239	0.681	0.280	0.915	0.139
Tuition & Fees (in thousands)	11.794	4.158	8.375	2.444	10.159	2.754	14.449	4.154
Rural	0.170	0.376	0.170	0.376	0.115	0.319	0.227	0.419
% Applicants Accepted	0.711	0.171	0.797	0.123	0.767	0.112	0.629	0.195
n	3,036		287		1,241		1,508	

Public Institutions	All		Non/Less		Competitive		Very/Highly/More	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Transfer Enrollment Rate	0.353	0.147	0.319	0.122	0.385	0.148	0.335	0.168
Attrition Rate	0.275	0.106	0.346	0.094	0.267	0.079	0.160	0.080
# of Majors	49.231	20.524	40.664	16.476	51.416	19.407	59.767	23.703
Log (Non-Tuition Current Fund Rev. per student)	11.233	1.116	10.655	0.860	11.271	0.976	12.231	1.164
Log (Average Undergraduate Enrollment)	8.911	0.748	8.587	0.726	8.987	0.674	9.325	0.714
State 2-yr. Student/ 4-yr. Student Ratio	0.756	0.509	0.555	0.333	0.834	0.542	0.933	0.571
% Freshman Living on Campus	0.576	0.307	0.477	0.291	0.592	0.302	0.720	0.287
Tuition & Fees (in thousands)	2.376	0.916	2.004	0.659	2.433	0.850	2.932	1.155
Rural	0.346	0.476	0.414	0.493	0.337	0.473	0.243	0.429
% Applicants Accepted	0.744	0.148	0.835	0.123	0.725	0.122	0.623	0.149
n	2,341		622		1,180		539	

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Table 3: Determinants of the Transfer Enrollment Rate

	Private		Public	
	Coeff.	Marg. Eff.	Coeff.	Marg. Eff.
Attrition Rate	1.6219**	0.2869	0.8329**	0.1892
	(0.4056)		(0.3180)	
# of Majors	0.0068	0.0012	-0.0021	-0.0005
	(0.0055)		(0.0030)	
Non-Tuition Current Fund Revenue per student, logged	-0.2164**	-0.0383	-0.1789**	-0.0406
	(0.0547)		(0.0647)	
Average Undergraduate Enrollment, logged	0.0530	0.0094	0.2127*	0.0483
	(0.1174)		(0.0955)	
State 2-yr. Student/ 4-yr. Student Ratio	0.3626**	0.0641	0.4704**	0.1069
	(0.0616)		(0.0538)	
% Freshman Living on Campus	-1.3261**	-0.2346	-0.8328**	-0.1892
	(0.1810)		(0.1023)	
Tuition & Fees (in thousands)	-0.0396**	-0.0070	-0.0967**	-0.0220
	(0.0094)		(0.0349)	
Rural	-0.2607**	-0.0461	0.0230	0.0052
	(0.0737)		(0.0630)	
% Applicants Accepted	1.0764**	0.1904	0.0309	0.0070
	(0.2030)		(0.1993)	
Non & Less Competitive	-0.0836	-0.0148	-0.3658**	-0.0831
	(0.1278)		(0.1159)	
Competitive	0.1084	0.0192	0.0128	0.0029
	(0.0768)		(0.0971)	
Comprehensive	-0.2282	-0.0404	-0.1887*	-0.0429
	(0.1275)		(0.0900)	
Liberal Arts I & II	-0.6262**	-0.1108	-0.2699	-0.0613
	(0.1334)		(0.1465)	
R^2	0.6363		0.4387	
n	3036		2341	

Note: Coefficients and standard errors (in parenthesis) are reported. * (**) denotes statistical significance at a 95 (99) percent level. Also included in each equation are year dichotomous variables. All regressions used robust standard errors with clustering and are weighted by the number of total years divided by the number of years that each institution is included in the sample.

Table 4: Determinants of the Transfer Enrollment Rate, Private Institutions

	Non/Less		Competitive		Very/Highly/Most	
	Coeff.	Marg. Eff.	Public	Marg. Eff.	Public	Marg. Eff.
Attrition Rate	1.2556	0.2613	1.0046*	0.2104	4.1360**	0.4847
	(0.9805)		(0.4901)		(0.7272)	
# of Majors	0.0125	0.0026	0.0067	0.0014	0.0009	0.0001
	(0.0115)		(0.0088)		(0.0074)	
Non-Tuition Current Fund Revenue per student, logged	-0.9755**	-0.2030	-0.2271*	-0.0476	-0.0445	-0.0052
	(0.1983)		(0.0993)		(0.0635)	
Average Undergraduate Enrollment, logged	0.3598	0.0749	-0.1503	-0.0315	0.2651	0.0311
	(0.2862)		(0.1678)		(0.1649)	
State 2-yr. Student/ 4-yr. Student Ratio	0.9702**	0.2019	0.4087**	0.0856	0.2695**	0.0316
	(0.2611)		(0.0903)		(0.0743)	
% Freshman Living on Campus	-0.6758	-0.1406	-1.2641**	-0.2648	-1.8245**	-0.2138
	(0.6255)		(0.2166)		(0.3005)	
Tuition & Fees (in thousands)	0.0276	0.0057	-0.0396*	-0.0083	-0.0340*	-0.0040
	(0.0349)		(0.0176)		(0.0121)	
Rural	-0.1170	-0.0243	-0.2602*	-0.0545	-0.2791**	-0.0327
	(0.2110)		(0.1107)		(0.1035)	
% Applicants Accepted	-1.3219	-0.2751	0.5858	0.1227	1.3182**	0.1545
	(0.5174)		(0.3445)		(0.2567)	
Comprehensive	0.0641	0.0133	-0.1319	-0.0276	-0.0314	-0.0037
	(0.7116)		(0.2032)		(0.1814)	
Liberal Arts I & II	-0.2393	-0.0498	-0.5484*	-0.1149	-0.1605	-0.0188
	(0.8236)		(0.2288)		(0.1727)	
R^2	0.5337		0.4797		0.6124	
n	287		1241		1508	

Note: Coefficients and standard errors (in parenthesis) are reported. * (**) denotes statistical significance at a 95 (99) percent level. Also included in each equation are year dichotomous variables. All regressions used robust standard errors with clustering and are weighted by the number of total years divided by the number of years that each institution is included in the sample.

Table 5: Determinants of the Transfer Enrollment Rate, Public Institutions

	Non/Less		Competitive		Very/Highly/Most	
	Coeff.	Marg. Eff.	Public	Marg. Eff.	Public	Marg. Eff.
Attrition Rate	0.3573	0.0778	0.6254	0.1474	2.8697**	0.3583
	(0.4208)		(0.3869)		(1.0690)	
# of Majors	0.0077	0.0017	-0.0076*	-0.0018	-0.0039	-0.0005
	(0.0059)		(0.0039)		(0.0059)	
Non-Tuition Current Fund Revenue per student, logged	-0.2812*	-0.0613	-0.1091	-0.0257	-0.1269	-0.0158
	(0.1269)		(0.0887)		(0.1072)	
Average Undergraduate Enrollment, logged	0.0975	0.0212	0.3744*	0.0882	0.1716	0.0214
	(0.1802)		(0.1559)		(0.2738)	
State 2-yr. Student/ 4-yr. Student Ratio	0.6146**	0.1339	0.5521**	0.1301	0.1647	0.0206
	(0.1473)		(0.0606)		(0.0923)	
% Freshman Living on Campus	-0.6491**	-0.1414	-0.7969**	-0.1878	-1.1590**	-0.1447
	(0.1654)		(0.1292)		(0.2339)	
Tuition & Fees (in thousands)	-0.0298	-0.0065	-0.0049	-0.0012	-0.1784**	-0.0223
	(0.0775)		(0.0458)		(0.0633)	
Rural	0.1447	0.0315	-0.0305	-0.0072	-0.2714	-0.0339
	(0.1058)		(0.0823)		(0.1397)	
% Applicants Accepted	-0.0775	-0.0169	0.2670	0.0629	-0.3508	-0.0438
	(0.3719)		(0.3198)		(0.4204)	
Comprehensive	-0.1842	-0.0401	-0.0997	-0.0235	-0.2040	-0.0255
	(0.1820)		(0.0946)		(0.2212)	
Liberal Arts I & II	-0.2808	-0.0612	-0.0564	-0.0133	0.0382	0.0048
	(0.2472)		(0.2234)		(0.3384)	
R^2	0.3015		0.5262		0.6317	
n	622		1180		539	

Note: Coefficients and standard errors (in parenthesis) are reported. * (**) denotes statistical significance at a 95 (99) percent level. Also included in each equation are year dichotomous variables. All regressions used robust standard errors with clustering and are weighted by the number of total years divided by the number of years that each institution is included in the sample.

Table 6: Determinants of the Transfer Enrollment Rate, Fixed Effects Model

	Private		Public	
	Coeff.	Marg. Eff.	Public	Marg. Eff.
Attrition Rate	0.4851**	0.0858	0.1312	0.0298
	(0.1828)		(0.1087)	
Non-Tuition Current Fund Revenue per student, logged	-0.0801*	-0.0142	-0.1761**	-0.0400
	(0.0365)		(0.0595)	
State 2-yr. Student/ 4-yr. Student Ratio	0.1995	0.0353	0.1209	0.0275
	(0.1531)		(0.0967)	
% Freshman Living on Campus	-0.1728	-0.0306	-0.1574**	-0.0358
	(0.0912)		(0.0587)	
Tuition & Fees (in thousands)	-0.0426**	-0.0075	-0.0339	-0.0077
	(0.0117)		(0.0184)	
% Applicants Accepted	0.1251	0.0221	-0.0414	-0.0094
	(0.1039)		(0.0728)	
n	3036		2341	

Note: Coefficients and standard errors (in parenthesis) are reported. * (**) denotes statistical significance at a 95 (99) percent level. Also included in each equation are year dichotomous variables.

Table 7: Determinants of the Transfer Enrollment Rate by Selectivity Categories, Fixed Effects Model

	Non/Less		Competitive		Very/Highly/Most	
Private Institutions	Coeff.	Marg. Eff.	Public	Marg. Eff.	Public	Marg. Eff.
Attrition Rate	0.7068	0.1471	0.5144**	0.1077	0.1732	0.0203
	(0.4536)		(0.2327)		(0.3884)	
Non-Tuition Current Fund Revenue per student, logged	-0.0802	-0.0167	-0.0351	-0.0074	-0.2063*	-0.0242
	(0.1556)		(0.0418)		(0.0811)	
State 2-yr. Student/ 4-yr. Student Ratio	0.3641	0.0758	-0.0946	-0.0198	0.4222	0.0495
	(0.6807)		(0.2261)		(0.2188)	
% Freshman Living on Campus	-0.5651**	-0.1176	-0.1050	-0.0220	-0.2784	-0.0326
	(0.2583)		(0.1114)		(0.1989)	
Tuition & Fees (in thousands)	-0.0765	-0.0159	-0.0166	-0.0035	-0.0438**	-0.0051
	(0.0434)		(0.0218)		(0.0167)	
% Applicants Accepted	-0.3754	-0.0781	0.0180	0.0038	0.3500*	0.0410
	(0.2903)		(0.1524)		(0.1633)	
n	287		1241		1508	

	Non/Less		Competitive		Very/Highly/Most	
Public Institutions	Coeff.	Marg. Eff.	Public	Marg. Eff.	Public	Marg. Eff.
Attrition Rate	0.4654*	0.1014	-0.1462	-0.0344	0.0289	0.0036
	(0.2310)		(0.1535)		(0.2111)	
Non-Tuition Current Fund Revenue per student, logged	-0.2613	-0.0569	-0.0405	-0.0095	-0.4013**	-0.0501
	(0.1450)		(0.0722)		(0.1519)	
State 2-yr. Student/ 4-yr. Student Ratio	0.1430	0.0311	0.0951	0.0224	0.1739	0.0217
	(0.2988)		(0.1263)		(0.1541)	
% Freshman Living on Campus	-0.1567	-0.0341	-0.0769	-0.0181	-0.2362*	-0.0295
	(0.1392)		(0.0837)		(0.0949)	
Tuition & Fees (in thousands)	-0.0894	-0.0195	-0.0545*	-0.0129	0.0305	0.0038
	(0.0696)		(0.0266)		(0.0267)	
% Applicants Accepted	0.1169	0.0255	0.1120	0.0264	-0.3740**	-0.0467
	(0.1713)		(0.0980)		(0.1343)	
n	622		1180		539	

Note: Coefficients and standard errors (in parenthesis) are reported. * (**) denotes statistical significance at a 95 (99) percent level. Also included in each equation are year dichotomous variables.

Figure 1: Transfer Enrollment Rates Over Time

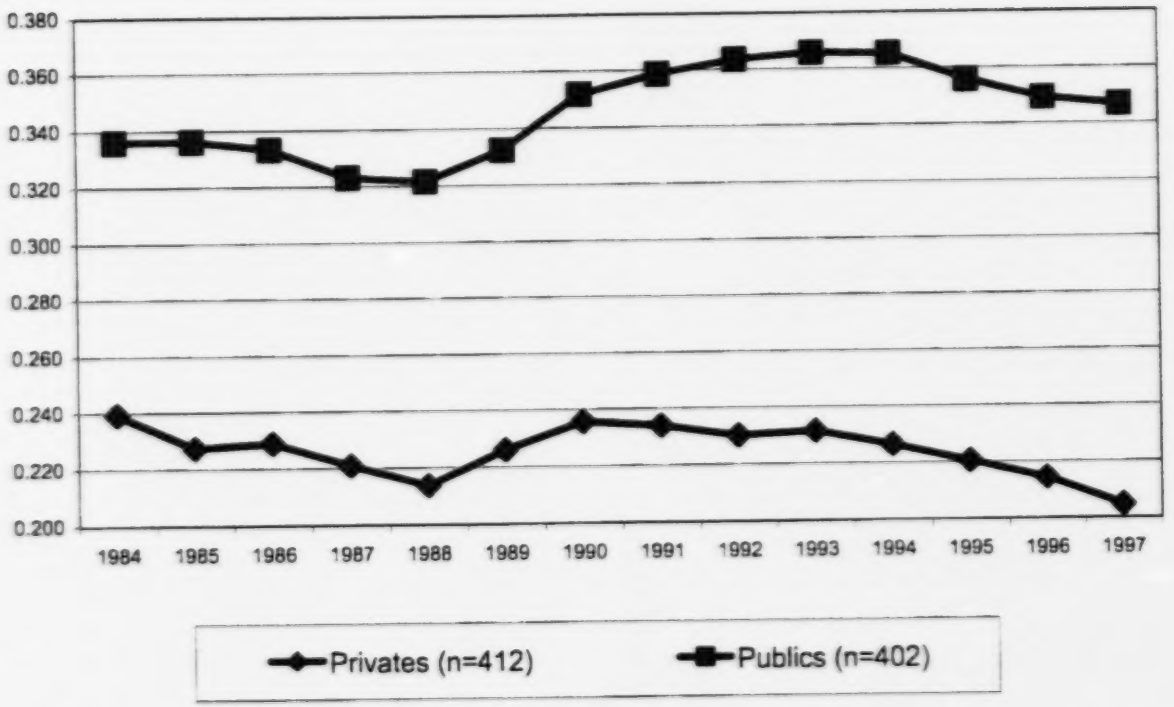


Figure 2: Application and Acceptance Figures for Private Institutions, Transfer / Freshman Ratio (n=325)

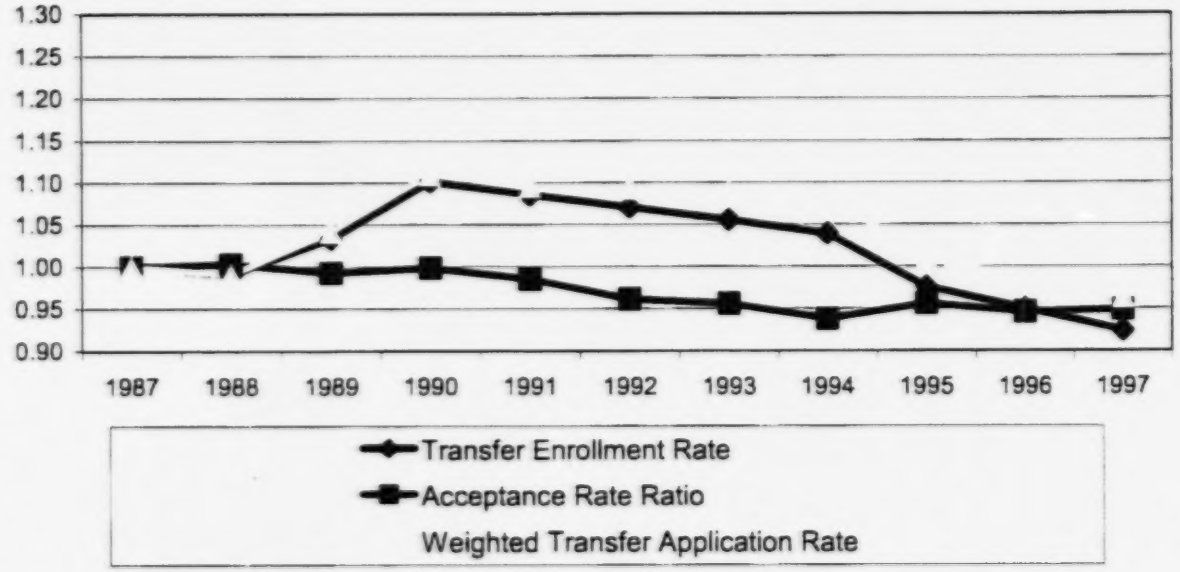
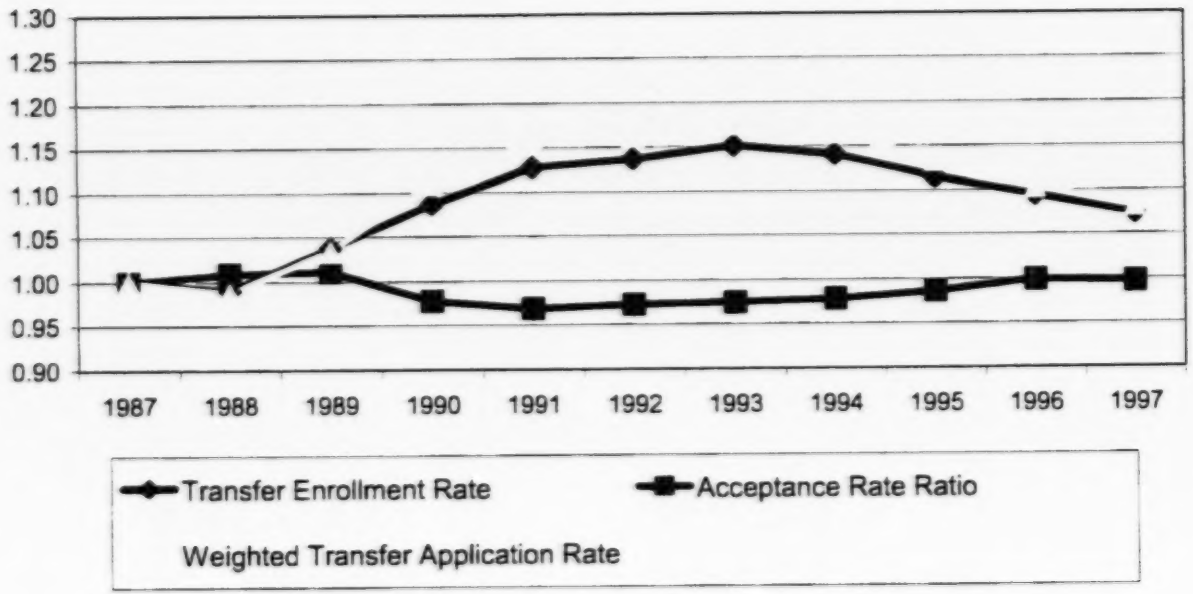


Figure 3: Application & Acceptance Figures for Public Institutions, Transfer/Freshman Ratio (n=256)



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